Armed Forces College of Medicine

AFCM

Diseases of kidney

Prof. Dr : Nermeen Salah

Lecture (2)

Nephritic syndrome

INTENDED LEARNING OBJECTIVES (ILO)

By the end of this lecture the students will be able to:

1.Analyse the different clinical findings in nephritic syndrome
2.Explain the pathogenesis of different types of glomerulonephritis causing nephritic syndrome
3.Correlate the clinical picture with histopathological features and other laboratory findings in cases of glomerulonephritis with nephritic syndrome.
4.Mention the pathological features of chronic diffuse glomerulonephritis, its clinical features and fate.

Nephritic syndrome

Definition:

usually of **acute** onset, characterized by:

1. Hematuria
2. Oliguria
3. Mild proteinuria (usually **less than 1 gm** protein in urine /day)
4. Hypertension
5. Nephritic Oedema

Starts in eyelids particularly in the morning then may become generalized

Nephritic syndrome

1-Hematuria

Inflammatory reaction→ severely injuries the capillary wall permitting blood to pass into urine→ **hematuria**

2-Oliguria

Hematuria → haemodynamic reactive changes → decrease in renal blood flow → decrease in glomerular filtration rate→ **oliguria**

3-Proteinuria (Mild)

Immune-mediated increase of capillary permeability to plasma protein

4-Hypertension

Decrease in renal blood flow

1-Reduced glomerular filtration rate → fluid retention

2- Augmented renin release from ischemic kidney→ stimulation of renin angiotension aldosterone system

5-Nephritic Oedema

1-↑capillary permeability to plasma protein→ leading to decreased **plasma osmotic pressure**

2-Salt & water retention leading to → Increased capillary **hydrostatic pressure**

1. Acute diffuse proliferative GN

= Post streptococcal glomerulonephritis

Clinical picture: Nephritic syndrome

Aetiology and Pathogenesis:

- It is an **immune complex** disease affecting **children.**

- It starts as an **upper respiratory tract infection or skin infection** by **nephritogenic** strains of **group A beta-haemolytic streptococci.**

- Within 1- 4 weeks, antibodies are formed and combine with streptococcal antigens → forming immune complexes → that deposited on the basement membrane of glomerular capillaries →complement activation → **injury of glomerular capillaries** by
  - Lytic effect of the complement
  - Attraction of neutrophils and release of their proteolytic enzymes

1. Acute diffuse proliferative GN

Microscopic:

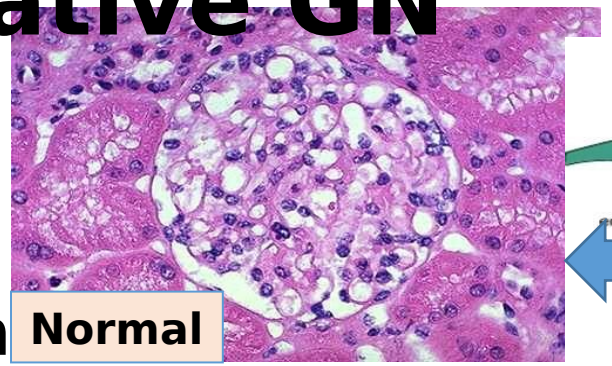
Light microscopy:

- Glomeruli :

  Affected in a ***diffuse*** man

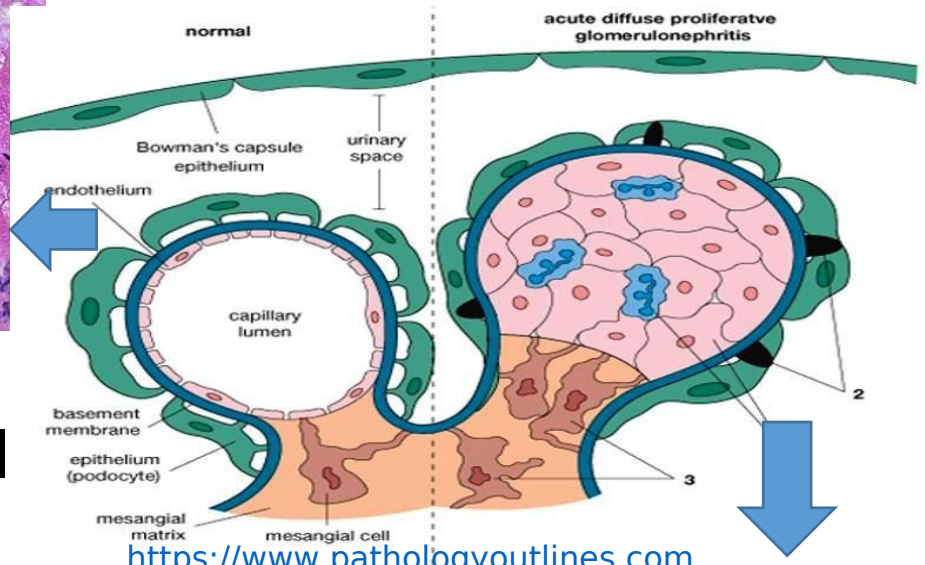
  - Enlarged & hypercellular due to
    - Proliferation and swelling of endothelial and mesangial cells
    - Infiltration by neutrophils and monocytes.

  - Obliteration of many of the capillary lumena by swollen and proliferated endothelial cells.

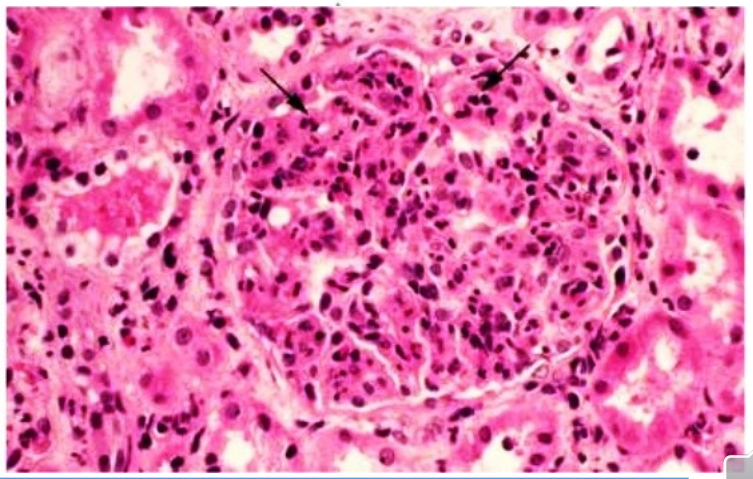


Normal

https://webpath.med.utah.edu/RENAHTML/RENAL101.html



https://www.pathologyoutlines.com



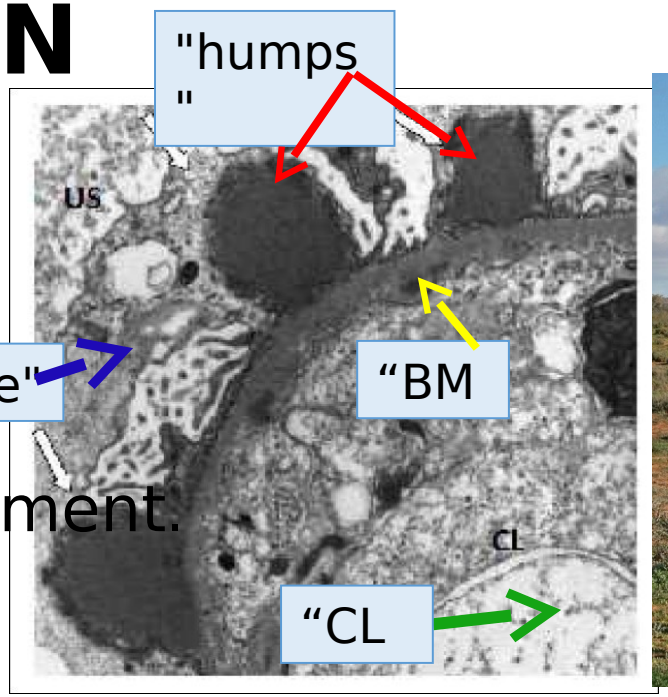
= Post-streptococcal GN

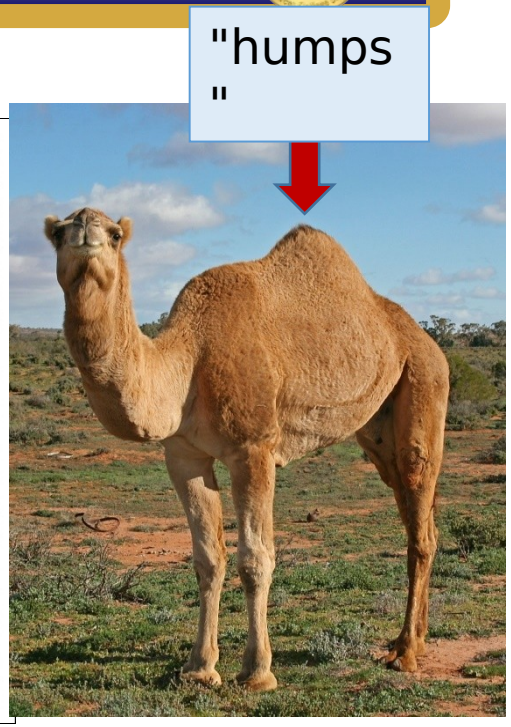
- **Tubules** : Red cell casts

1. Acute diffuse proliferative GN

Electron Microscopy

Subepithelial immune complex deposits between podocytes and glomerular basement membrane known as "**humps**".

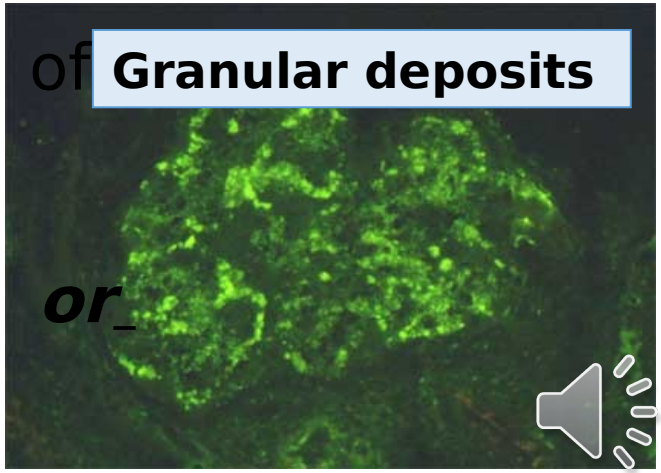




http://www.sjkdt.org

Immunofluorescence:

Granular deposits of IgG, IgM & complement.



https://link.springer.com

Fate

- **Recovery** in **more than 95%** of children and in **(⅔)** of adults
- Development of
  - **Rapidly progressive glomerulonephritis**
  - **Chronic glomerulonephritis**
- **Rarely death** from acute renal failure

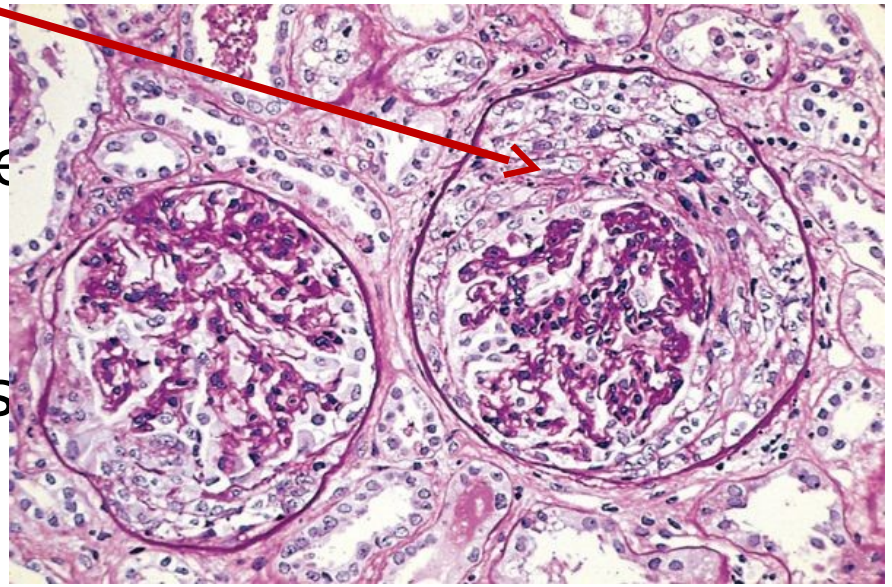
2. Rapidly progressive (Crescentic) GN

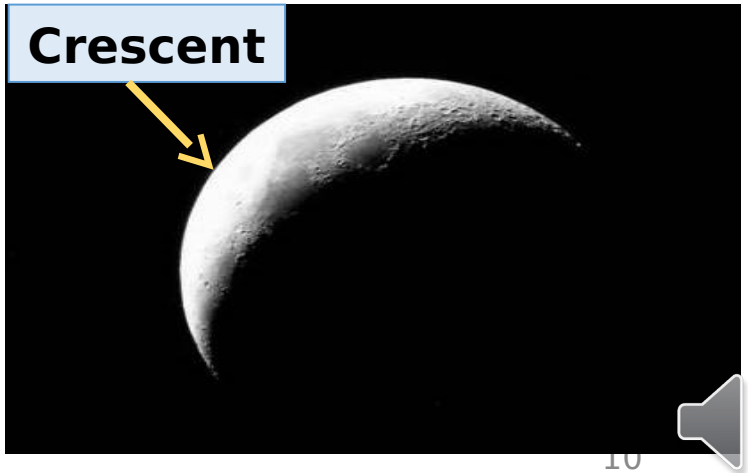
- **Rapidly progressive**
  Due to rapid progression to acute renal failure

- **Crescentic glomerulonephritis**
  Due to microscopic development of crescents

Clinical manifestations

Nephritic syndrome





2. Rapidly progressive (Crescentic) GN

Aetiology and Pathogenesis:

1-Immune complex mediated GN

- as a complication of ***poststreptococcal glomerulonephritis***
- ***Systemic lupus erythematosus (SLE)***

2-Antiglomerular basement membrane antibody mediated GN

- as in *Goodpasture's syndrome* .

2. Rapidly progressive (Crescentic) GN

Goodpasture's syndrome

- It is an **autoimmune disease** showing
  Rapidly progressive (crescentic) glomerulonephritis
  &
  Pulmonary hemorrhages

- Due to antiglomerular basement membrane antibodies that cross react with alveolar capillary basement membrane.

2. Rapidly progressive (Crescentic) GN

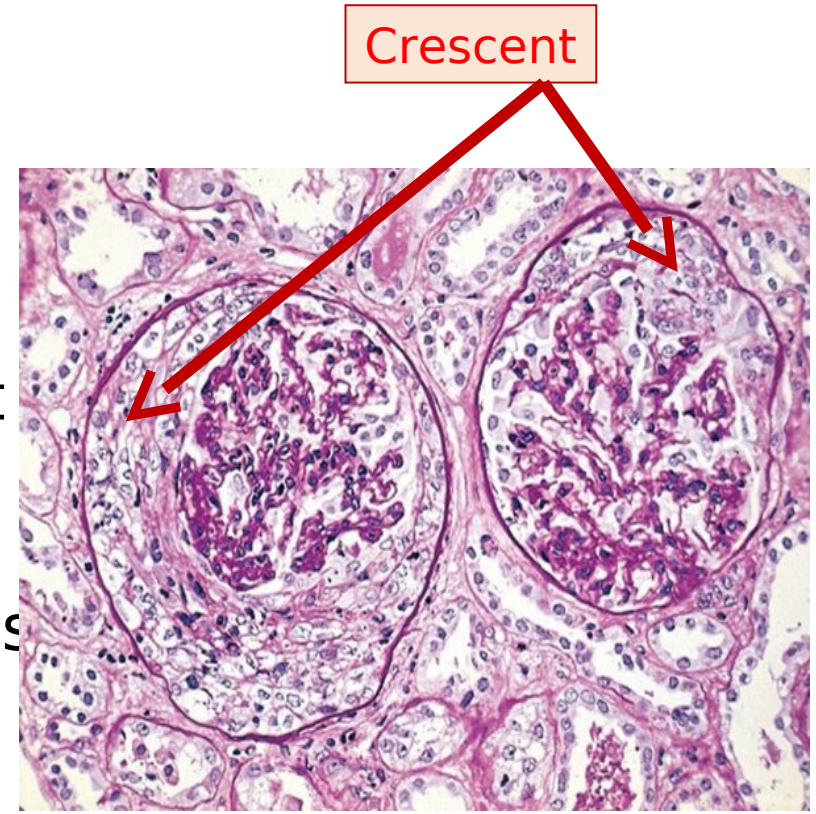
Microscopic

Segmental necrosis

Light microscopy

Glomeruli Show

- **Segmental necrosis** & glomerular basement membrane breaks
- **Crescents:** Proliferated parietal epithelial cells in response to fibrin deposition in bowman's space.



2. Rapidly progressive (Crescentic) GN

Electron microscopy & immunofluorescence

1-Immune complex mediated crescentic GN:

- Characterized by **granular deposits** along glomerular capillary wall

2-Antiglomerular basement membrane antibody mediated crescentic GN:

- Characterized by **linear deposits** of IgG and C_3 along the glomerular basement membrane (as in ***Goodpasture's syndrome)***

Chronic diffuse glomerulonephritis

= Chronic end stage kidney

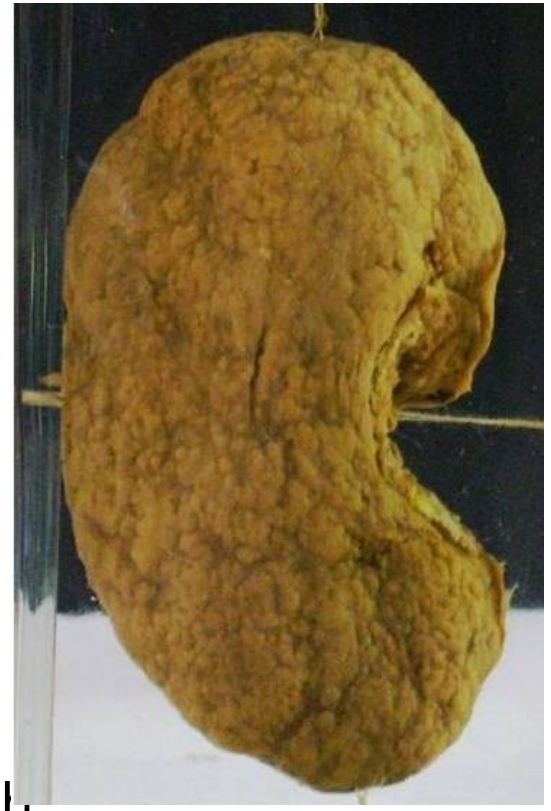
End stage of most types of glomerular diseases.

Resulting in **chronic renal failure**

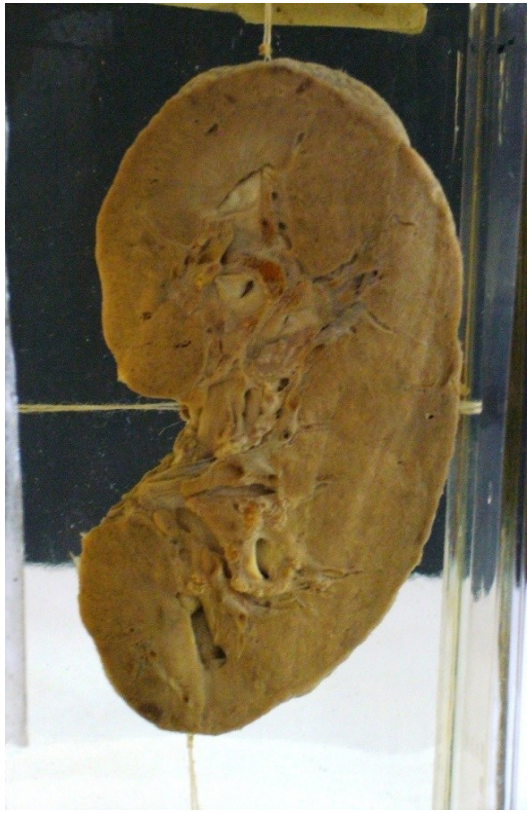
Pathological features

Gross:

- Both kidneys are **symmetrically contracted**
- **Outer surface:**
  - Finely granular with adherent capsule which strips with difficulty
- **Cut section reveals:**
  - **Atrophic cortex** and **medulla** with loss of demarcation between them
  - Relative increase in **peripelvic fat**



Outer surface



Cut section

Chronic diffuse glomerulonephritis

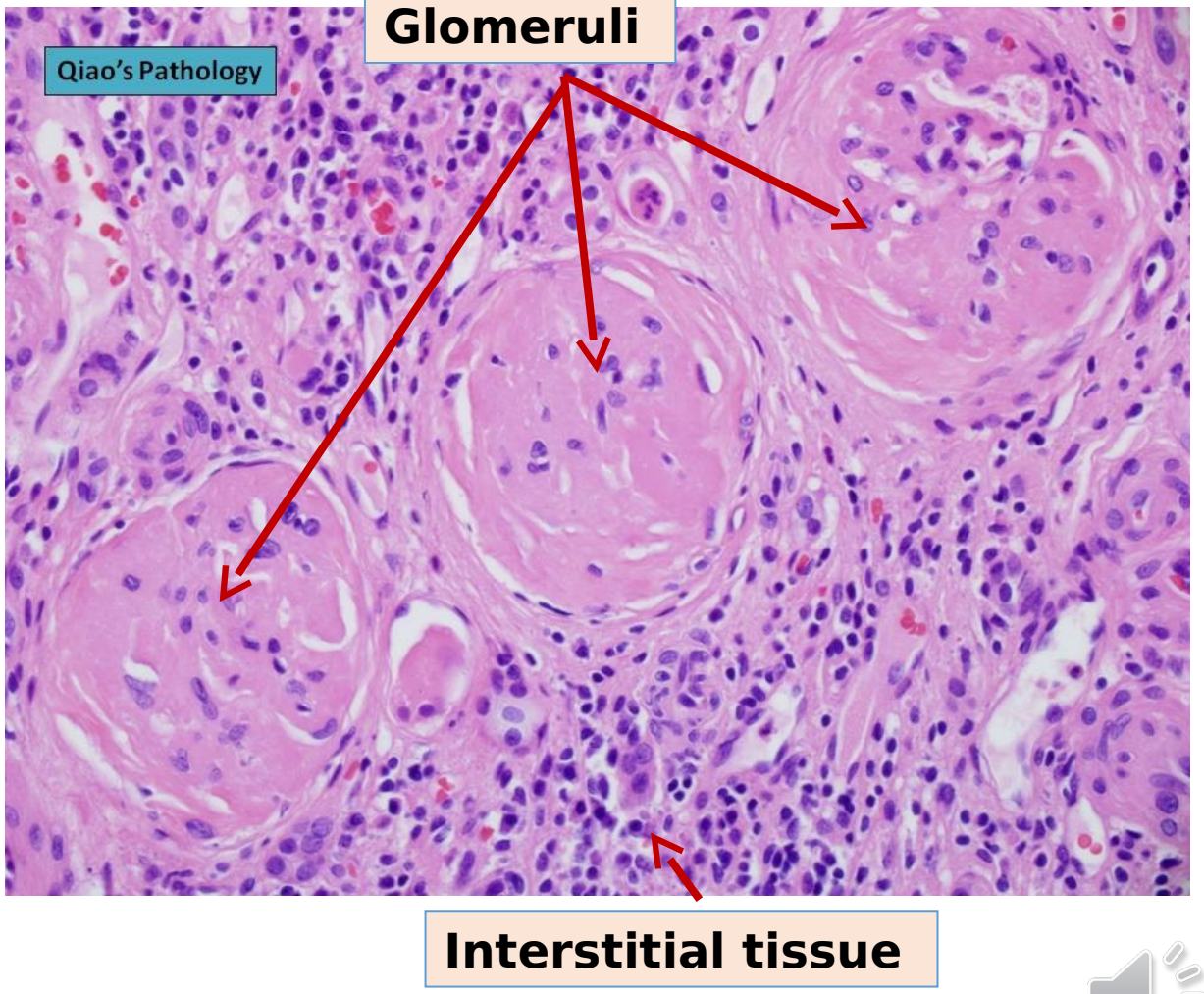
Microscopic:

Glomeruli are fibrosed

Tubules are atrophic, some show compensatory cystic dilatation

Interstitial tissue shows chronic inflammatory cells and fibrosis.

Arterioles are thickened with narrow lumen secondary to hypertension



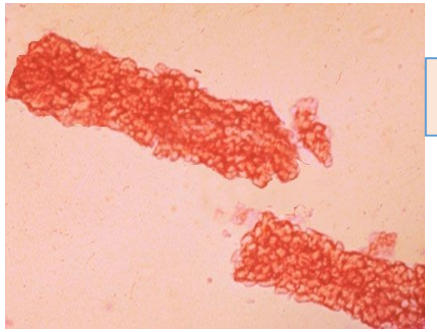
Quiz

1- Numerous large epithelial crescents occur in which of the following renal diseases?

a)Membranous GN
b)Rapidly progressive GN
c)Minimal change GN
d)Membrano-proliferative GN

2- Which of the following is a characteristic feature of acute diffuse GN ?

a)Heavy proteinuria
b)Crescent formation
c)Hematuria
d)Hyperlipidaemia



Red cell casts

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SUGGESTED TEXTBOOKS

1. Robbins basic pathology 10th edition, 2018.Chapter 14: Kidney and its collecting system.

2. Kaplan step 1 pathology lecture notes. Chapter 15: Renal pathology; 2017 (P.143-156)

Thank you